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Intense PC2
Product Overview

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CompuLab

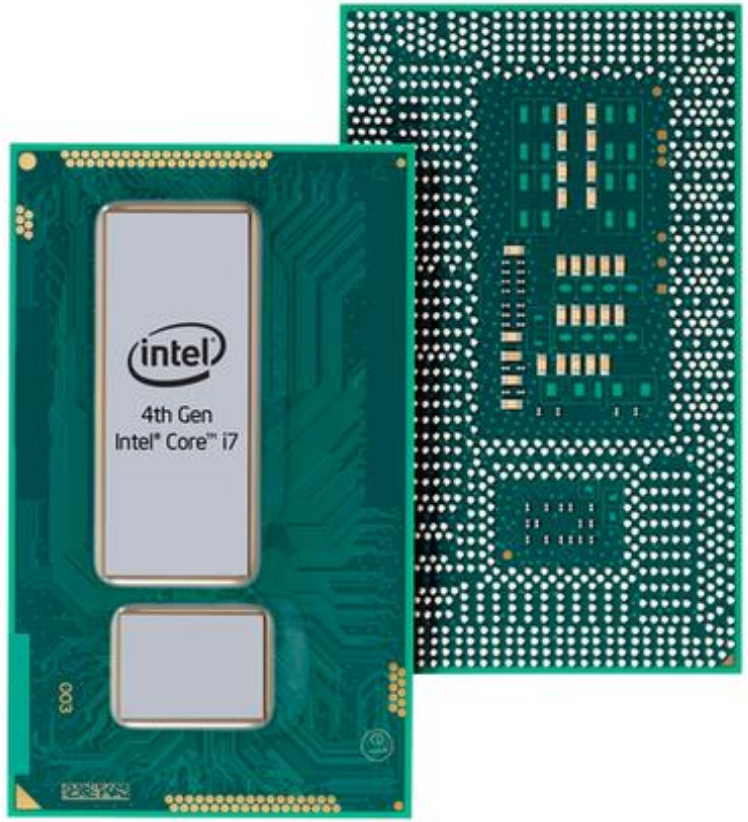
Agenda

- Haswell ULT Mobile Platform
- Intense PC2 Product Brief
  - Features Highlight, Top Level Block Diagram
  - Models and Processor SKUs
  - Memory Interface
  - Graphics and Display Interface
  - Storage Interface
  - Connectivity
  - Power & Environmental Characteristics
- Unique Functionality, Advanced Technologies
- Prices
- FACE Modules

Haswell ULT x86 Mobile Platform

Microsoft

Linux™



intel inside CORE™ i3 intel inside CORE™ i5 intel inside CORE™ i7

Intense PC2 – Operating Systems

- Windows 8, 32/64-bit
- Windows 7, 32/64-bit
- Windows Server 2012 R2
- Linux Mint 16, 32/64-bit
- Linux Mint 15, 32/64-bit
- Linux Ubuntu, 32/64-bit
- Other Linux distros can be verified by customers
- Embedded versions

Notes:

Connected Standby is not supported.

Intense PC2 – Front/Back Panel View

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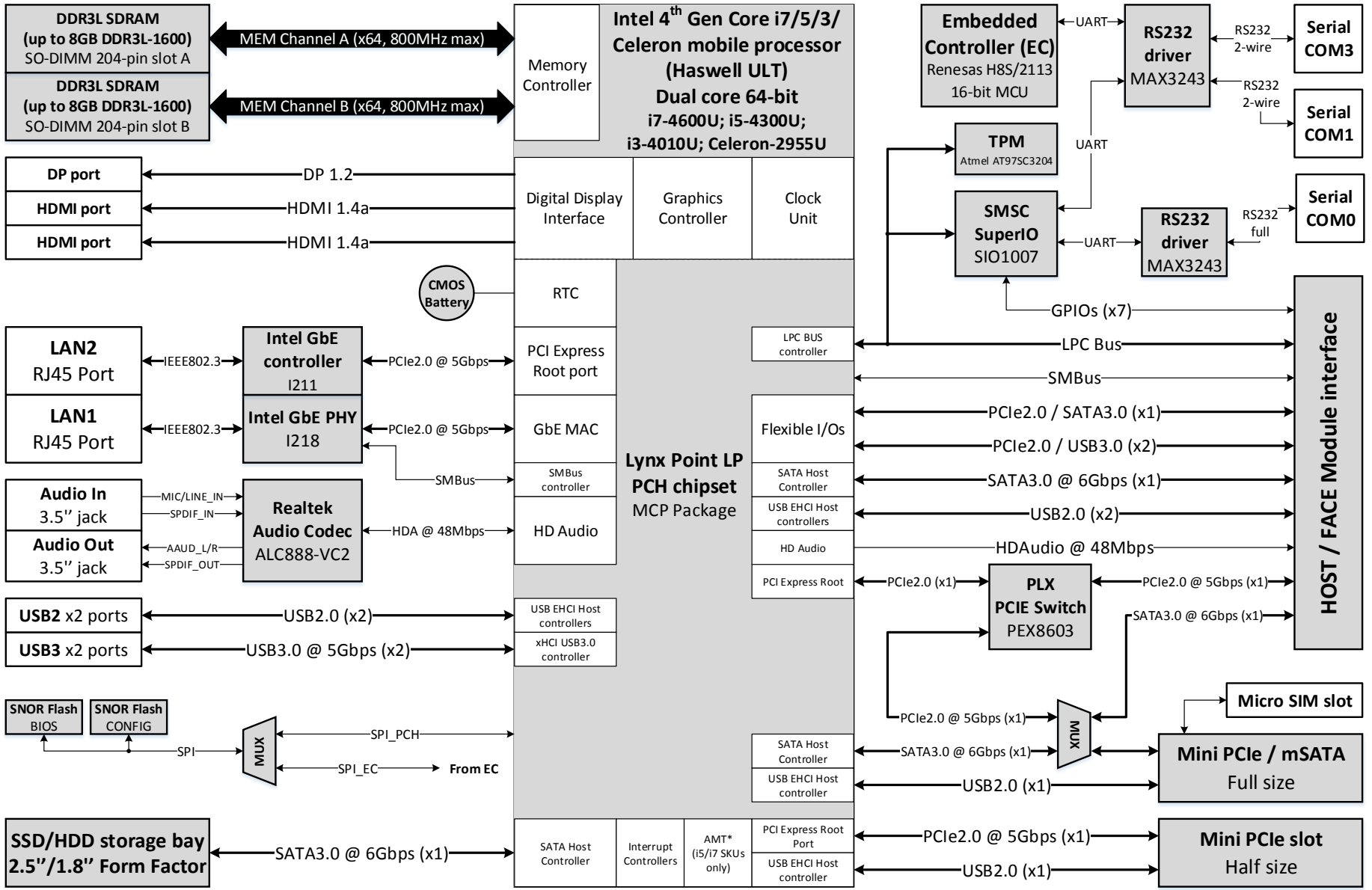
Intense PC2 – Features Highlight

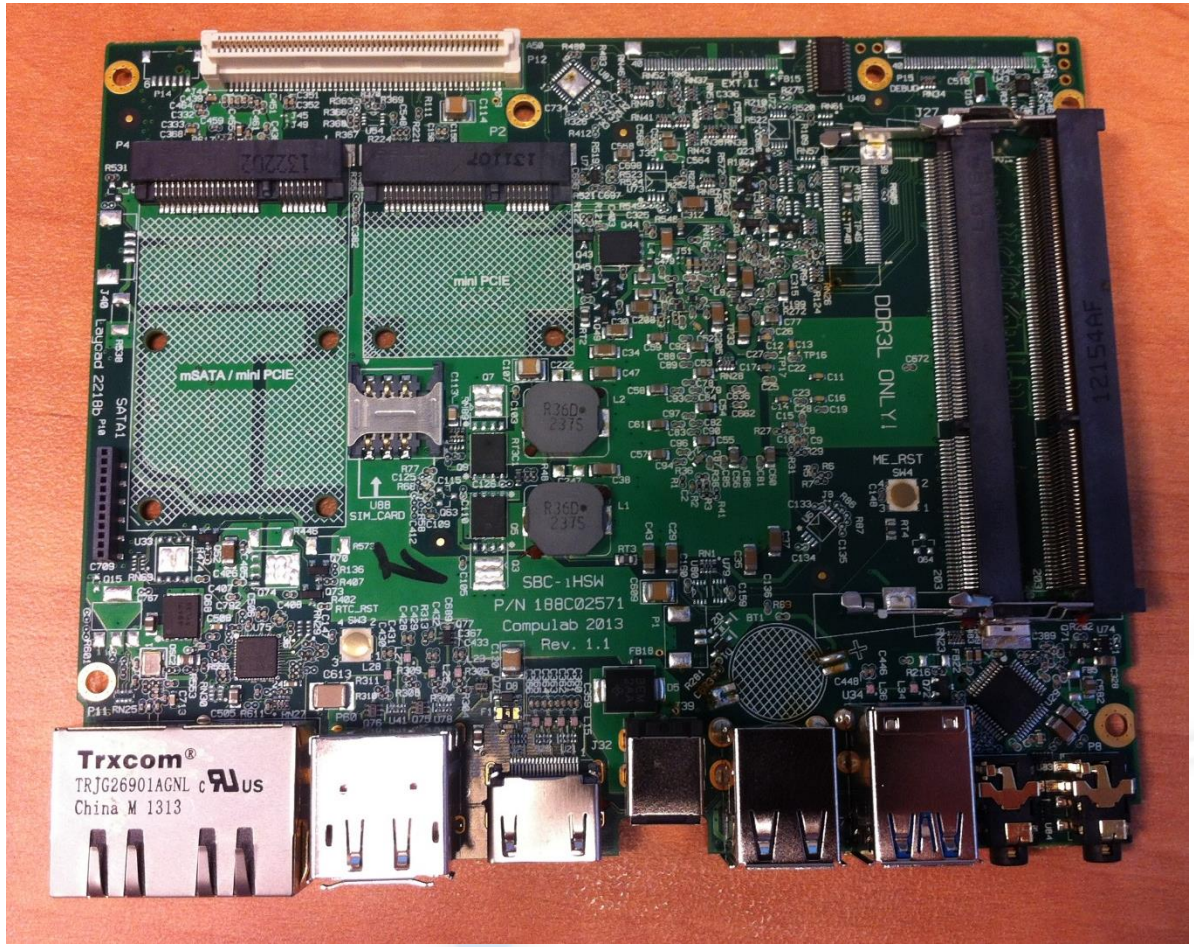
- Platform
  - Intel 4th Gen Core i7/5/3/Celeron @ 15W TDP
  - Dual core 64-bit @ 1.4GHz – 2.1GHz (turbo boost up to 3.3GHz)
  - Up to 16GB DDR3L-1333/1600 memory
  - 2.5” HDD/SSD storage
- Connectivity
  - Display Interface x3 (DisplayPort, 2x HDMI)
  - Analog/digital audio input/output
  - Intel GbE LAN x2
  - Intel dual band WLAN 802.3 ac + Bluetooth 4.0
  - USB3.0 x4, USB2.0 x2
  - RS232 serial ports x3
  - SIM slot

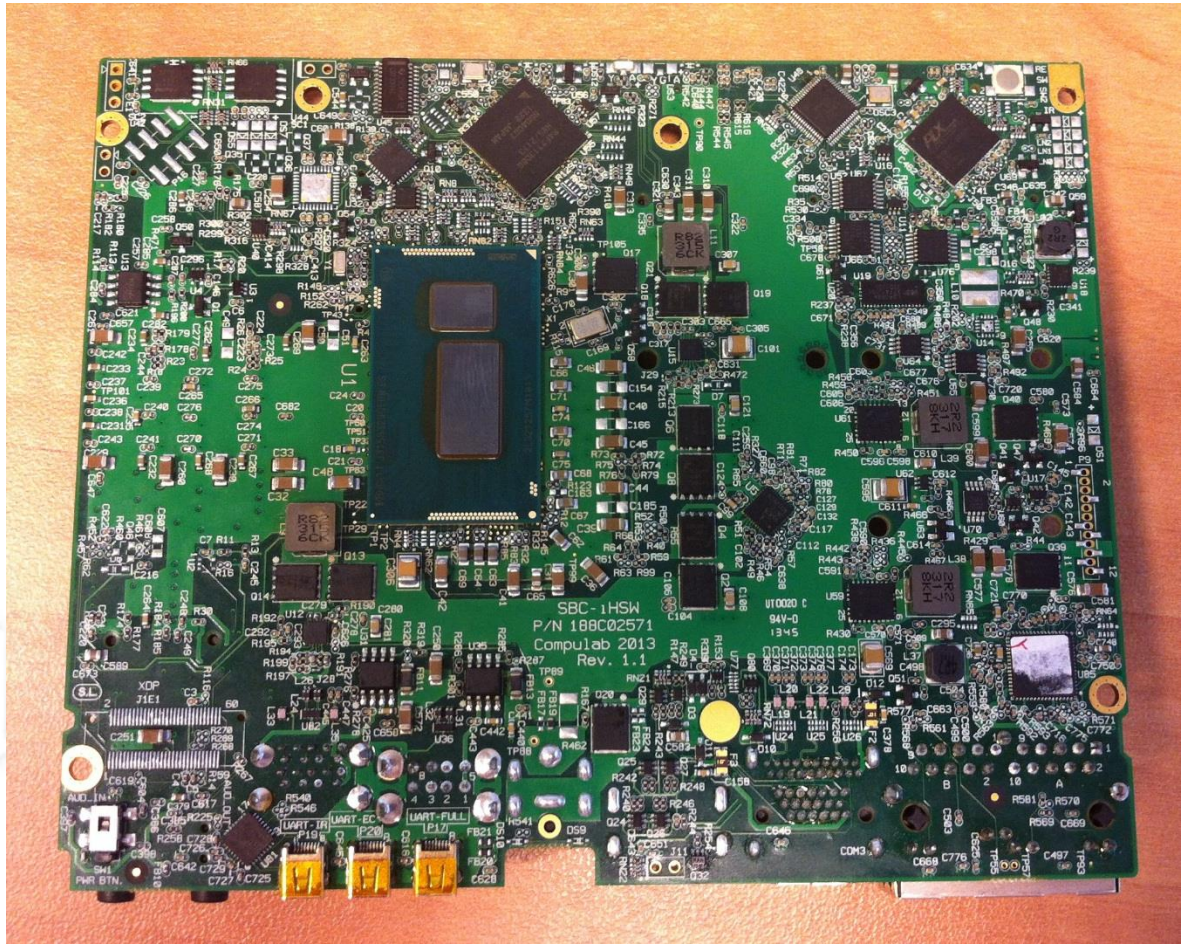
- Expansion
  - Mini PCIe slots x2 (full/half size)
  - mSATA x2 (shared Mini PCIe)
  - FACE Module
- OS
  - Windows 7/8, 32/64-bit
  - Windows Server 2012 R2
  - Linux 32/64-bit

Intense PC2 – Top Level Block Diagram



Intense PC2


mSATA / mini PCIE
mini PCIE
DDR3L ONLY!
SBC-1HSW
P/N 188C02571
Compulab 2013
Rev. 1.1
Trxcom®
TRJG26901AGNL
China M 1313


SBC-1HSW
P/N 188C02571
Compulab 2013
Rev. 1.1

Intense PC2 – Models & Processor SKUs

Model	IPC2 Value	IPC2 i3	IPC2 i5	IPC2 i7
Processor	Celeron 2955U	i3-4010U	i5-4300U	i7-4600U
Cores	64-bit dual core	64-bit dual core	64-bit dual core	64-bit dual core
Core Clock	1.4GHz	1.7GHz	1.9GHz (boost to 2.9GHz)	2.1GHz (boost to 3.3GHz)
# of Threads	2	4	4	4
Last Level Cache	2MB	3MB	3MB	4MB
Lithography	22nm	22nm	22nm	22nm
TDP	15W	15W	15W	15W
Chipset	Intel 8 Series Lynx Point	Intel 8 Series Lynx Point	Intel 8 Series Lynx Point	Intel 8 Series Lynx Point
Graphics	Intel HD	Intel HD4400	Intel HD4400	Intel HD4400
Graphics Memory Allocated/Max	512MB/1.7GB	512MB/1.7GB	512MB/1.7GB	512MB/1.7GB

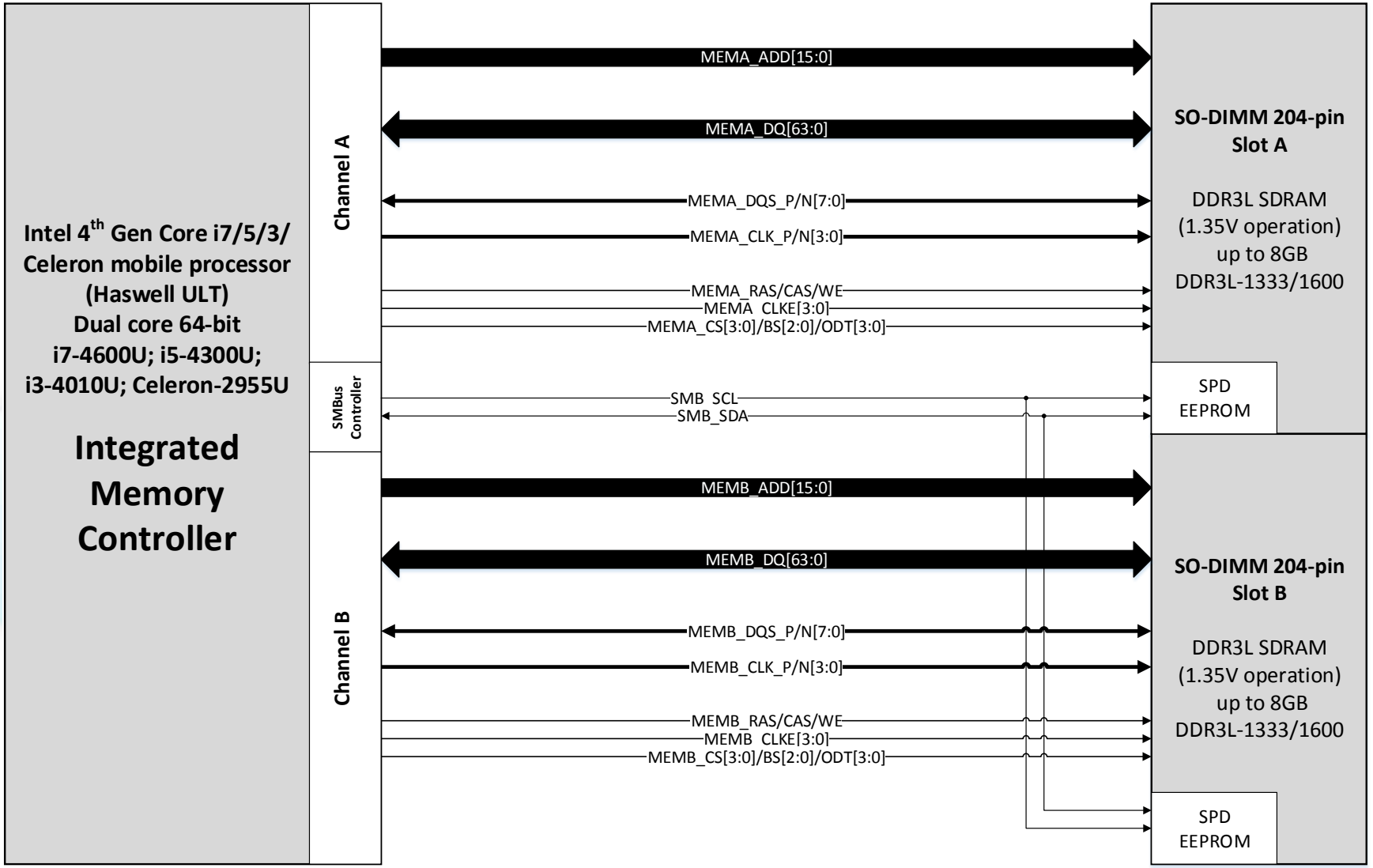
Intense PC2 – Memory Interface

- Two 64-bit wide channels of DDR3L/DDR3L-RS and LPDDR3 memory
- Non-ECC, Unbuffered DDR3L/DDR3L-RS SO-DIMMs
- Single-channel and dual-channel memory organization modes
- DDR3L/DDR3L-RS I/O Operating Voltage of 1.35V
- BW_{max} = 21.3 GB/s in dual channel mode with DDR3L-1333
- BW_{max} = 25.6 GB/s in dual channel mode with DDR3L-1600

Notes:

1. http://www.anandtech.com/show/6320/micron-announces-30nm-ddr3lrs-products
2. DDR3L-RS is supported as a POR memory configuration. Actual validation checkout depends on parts and vendor availability. Refer to the Intel Marketing POR document for details on DDR3L-RS support for non-CS designs. CS stands for "Connected Standby".

Intense PC2 – Memory Interface



Intense PC2 – Graphics and Display Interface

Digital Display Interface (DDI)		Supported Video Resolutions & Audio Formats
DDI1	HDMI 1.4a	4096 x 2304 @ 24 Hz
DDI2	HDMI 1.4a	4096 x 2304 @ 24 Hz
DDI3	DisplayPort 1.2	3200 x 2000 @ 60 Hz
Embedded Audio		AC-3 Dolby* Digital; Dolby Digital Plus; DTS-HD*; LPCM 192 kHz/24 bit, 8 Channel; Dolby TrueHD, DTS-HD Master Audio* (Lossless Blu-Ray Disc Audio Format)

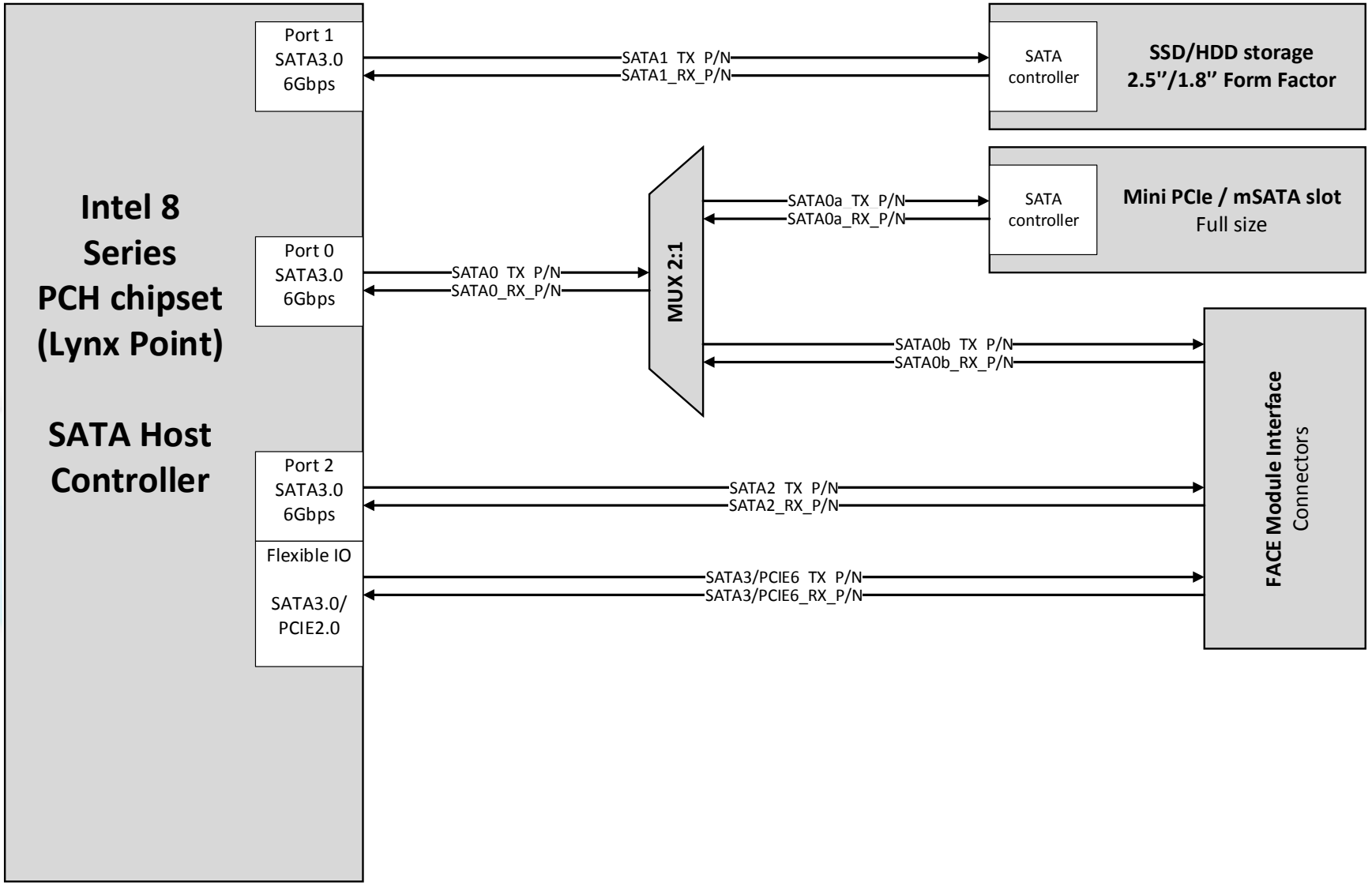
- DVI: x3 TMDS Lanes @ 1.65Gbps; BW_{max} = 4.95Gbps, $Throughput_{max}$ = 3.96Gbps (due to 8b/10b encoding overhead)
- HDMI1.4a: x3 TMDS Lanes @ 1.65Gbps, 3Gbps; BW_{max} = 9Gbps, $Throughput_{max}$ = 7.2Gbps (due to 8b/10b encoding overhead)
- DP1.1: x4 Main Lanes @ 1.62Gbps, 2.7Gbps; BW_{max} = 10.8Gbps, $Throughput_{max}$ = 8.64Gbps (due to 8b/10b data embedded clock encoding overhead)
- DP1.2: x4 Main Lanes @ 1.62Gbps, 2.7Gbps or 5.4Gbps; BW_{max} = 21.6Gbps, $Throughput_{max}$ = 17.28Gbps (due to 8b/10b data embedded clock encoding overhead)

Intense PC2 – Storage

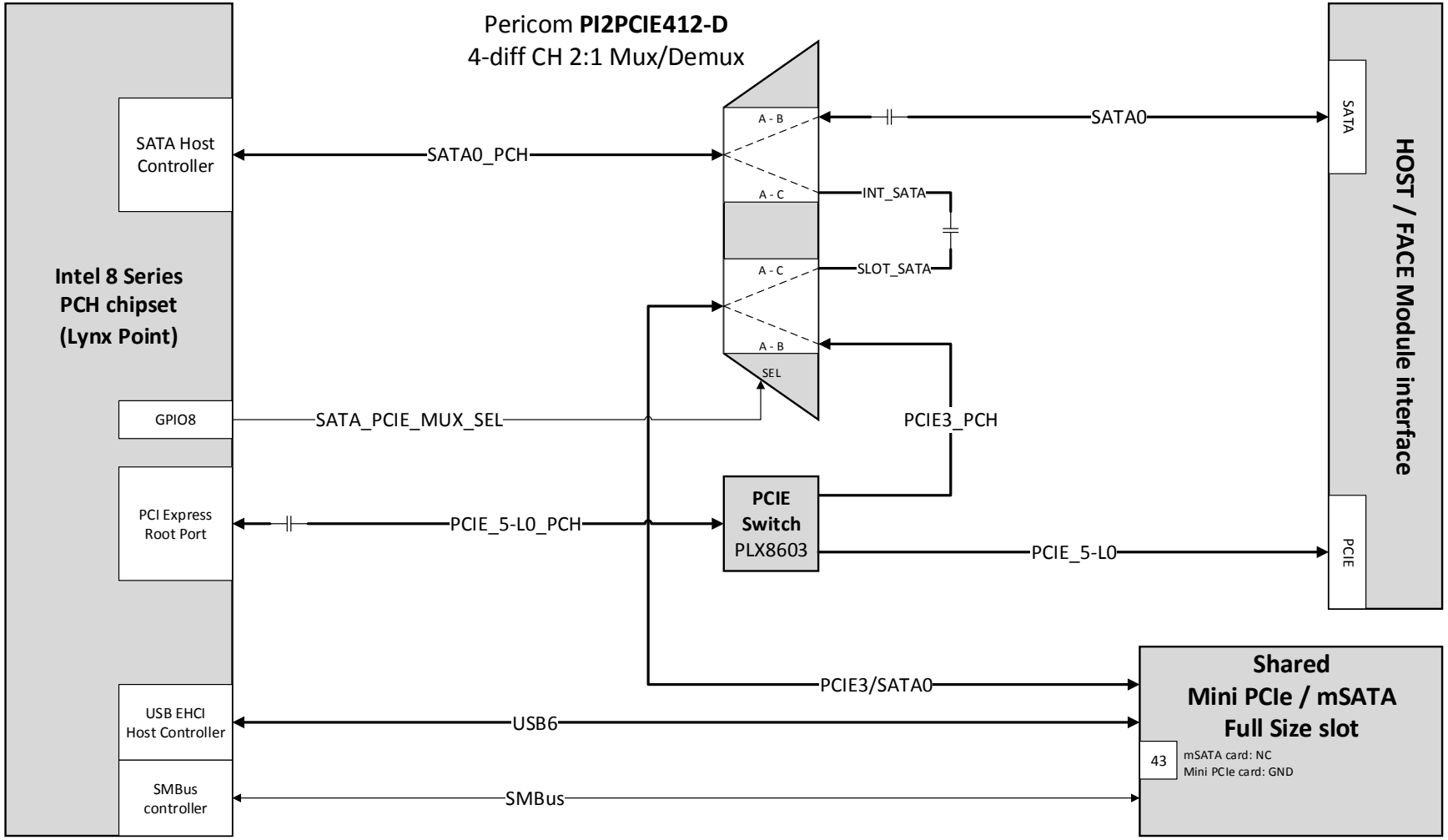
- SATA Host Controller supports AHCI or RAID mode
- 6x SATA3.0 ports with transfer rates up to 6Gbps
- Hot-Plug is supported on all SATA ports
- PCH does Not support Port Multiplier, FIS Based Switching, Command Based Switching, IDE mode or combination mode, Cold Presence Detect
- Examples (from Compulab stock):

Manufacturer	Type	Capacity	PN/Model Name
Micron Phison	mSATA SSD	120 GB	MTFDDAT120MAV EA6350110QS2TI114SVEC
Micron ADATA	2.5'' SSD	128 GB	MTFDDAC128MAM AS510S3-120GM-C
Hitachi Western Digital Seagate Toshiba	2.5'' HDD, 5400rpm	500 GB	HCC547550A9E380 WD5000LPVX ST905003N1A1AS-RK MK50[5|6]5GSX
Western Digital Hitachi	2.5'' HDD, 5400rpm	1 TB	WD10JPVT HCC541010A9E680

Intense PC2 – SATA Interface Scheme



Intense PC2 – mSATA/mini PCIe Multiplexing



BIOS Settings
Advanced → South Bridge Configuration →mSATA-PCIE

Mux Switching Logic
MUX SEL HIGH (A-C): mSATA (default)
MUX SEL LOW (A-B): Mini PCIe

Intense PC2 – PCI Express

- PCI Express 2.0 specification with transfer rates up to 5.0 GT/s
- Implemented ports:
  - 4x Native PCIe root ports
  - 3x Flexible SerDes IO ports
- Dedicated ports:
  - 3x Native PCIe root ports
- Custom use ports:
  - 1x Native PCIe root ports
  - 3x Flexible SerDes IO ports

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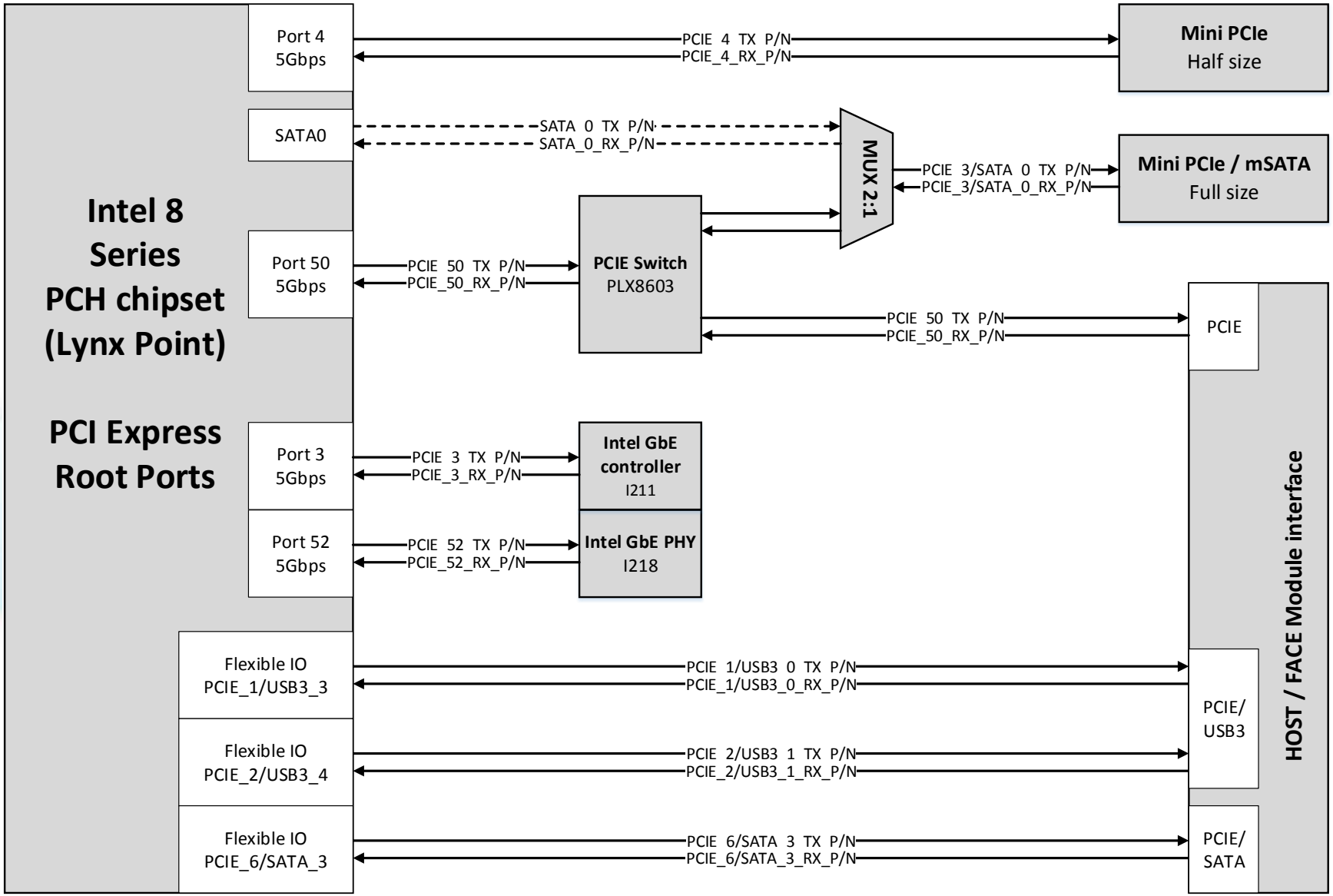
Intense PC2 – PCI Express Scheme



Intense PC2 – Networking

- 2x Intel GbE LAN ports
- LAN1 – Intel I218 GbE “Clarkville” PHY + PCH integrated MAC
- LAN2 – Intel I211 GbE Controller

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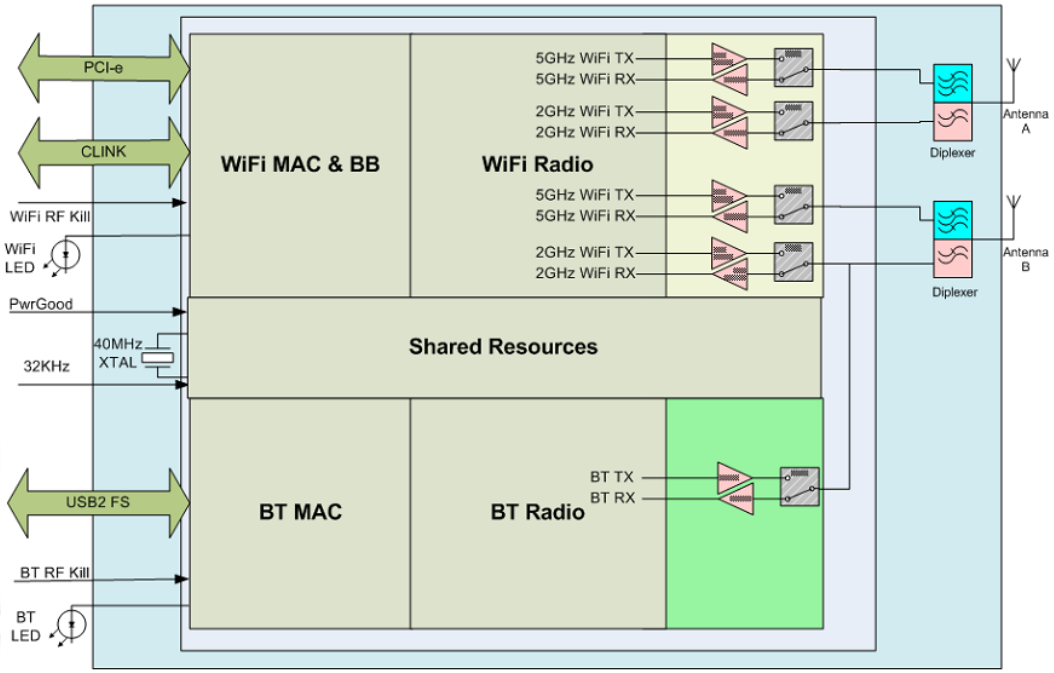
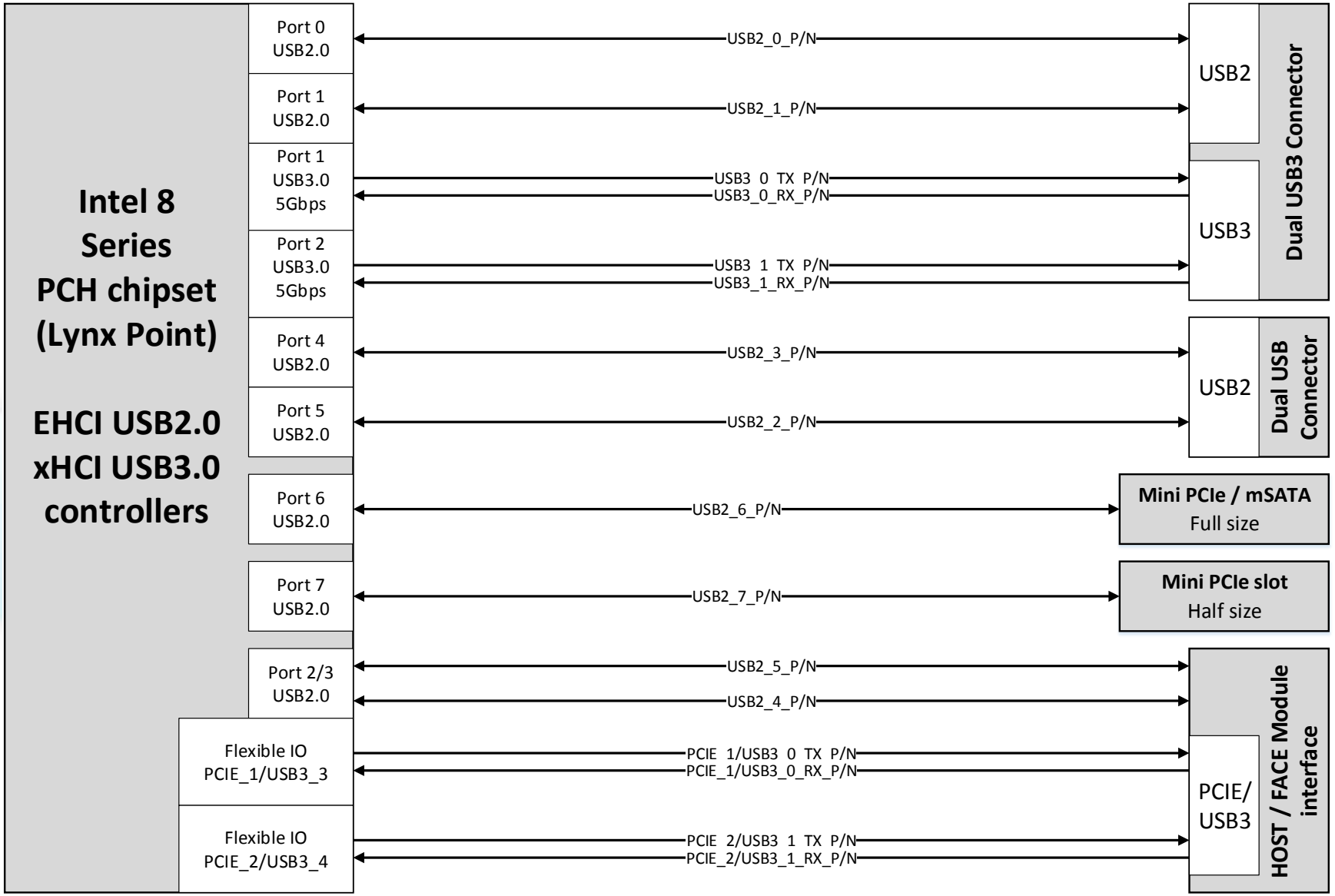
Intense PC2 – Wireless WLAN/BT Connectivity

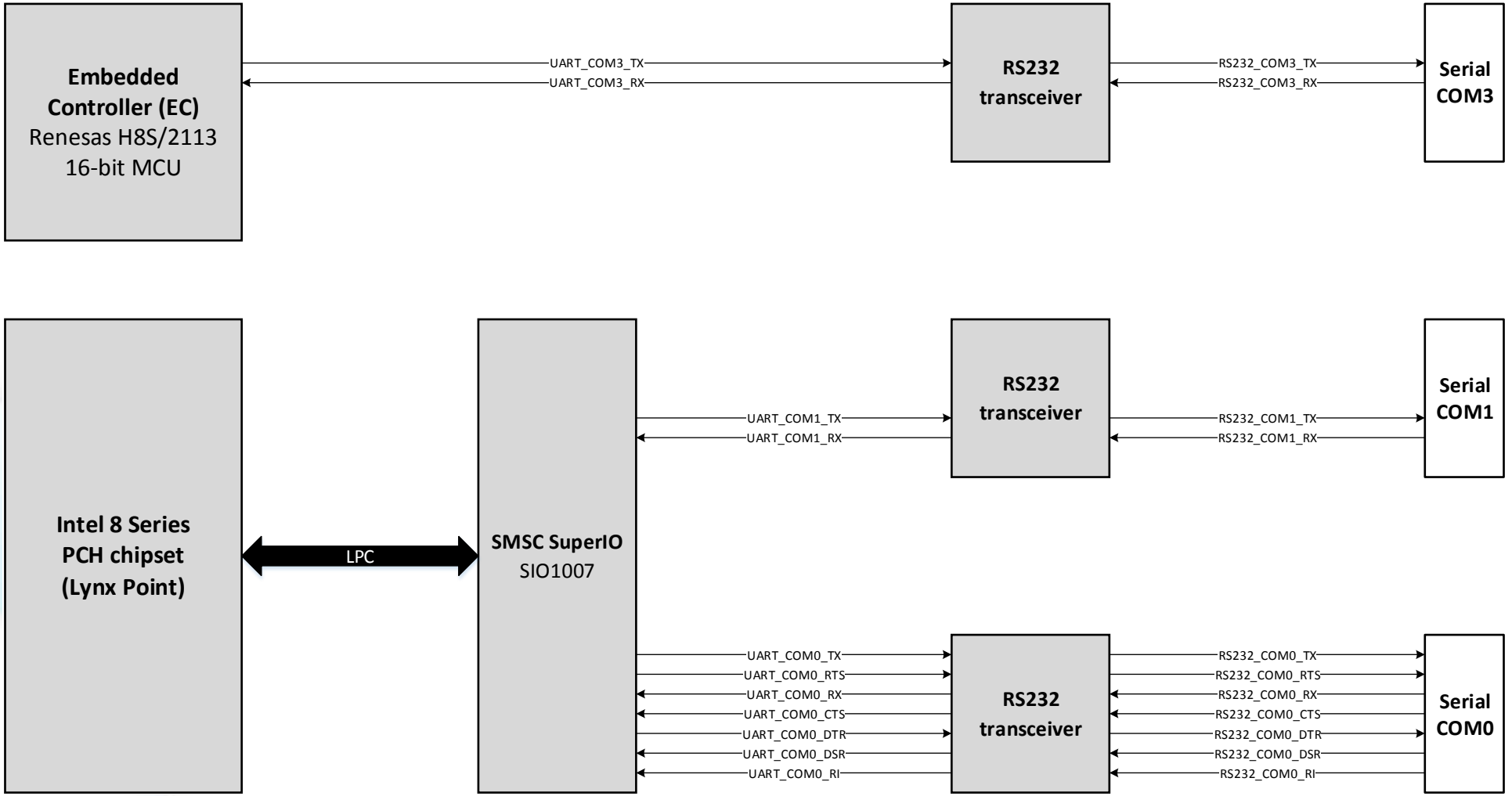
- Intel® Dual Band Wireless-AC 7260 2x2 AC + BT
- Mini PCI Express Form Factor
- WLAN 802.11ac
  - Throughput: 867Mbps
  - Frequency bands: 2.4GHz or 5GHz
  - Tx/Rx chains: 2x2
  - PCI Express host interface
  - AMT support
- Bluetooth 4.0
  - BT3.0 + HS + Low Energy (BLE)
  - Throughput: 24Mbps
  - Frequency band: 2.4GHz
  - USB host interface
- Two RF antennas: 1x WiFi dedicated, 1x WiFi/BT shared



Intense PC2 – USB Interface Scheme

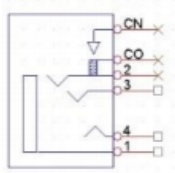


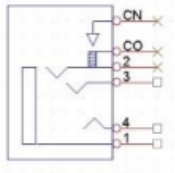
Intense PC2 – Serial Ports



Intense PC2 – Audio

- Realtek ALC888-VC2 HD audio codec
- Audio Output:
  - Analog Amp stereo output capable to drive 16/32Ω loads
  - Digital 7.1 channels S/PDIF output
  - 3.5mm jack
- Audio Input:
  - Analog stereo microphone input
  - Digital S/PDIF input
  - 3.5mm jack

Pin	Signal Name	Jack pin-out	Mating plug
1	AUDIO_GND		
2	SPDIF_OUT		
3	AUDIO_OUT_R		
4	AUDIO_OUT_L		

Pin	Signal Name	Jack pin-out	Mating plug
1	AUDIO_GND		
2	SPDIF_IN		
3	AUDIO_IN_R		
4	AUDIO_IN_L		

Intense PC2 – Power & Environmental

Power Supply	12Vdc nominal (10V – 15V)

ACPI Power State	Power Consumption	Operating Conditions
G0/S0 (Active, system 90% load)	24W	Active
G0/S0 (Active, system 10% load)	6W	Active
G1/S3 (Suspend to RAM)	~1W	Sleep
G1/S4 (Suspend to Disk)	~1W	Hibernate
G2/S5 (Soft Off)	~1W	Shut down
G3 (Mechanical Off)	6-10uA for RTC	RTC is powered from battery
Average working consumption	**15W**	

Operating Conditions	Operating Temperature Grades		
	Commercial	Extended (TE)	Industrial (TI)
HDD models	0°C – 50°C	N/A	N/A
SSD models	0°C – 70°C	-20°C – 70°C	-40°C – 70°C

Intense PC2 – Intel Active Management Technology (AMT)

- Part of Intel Management Engine HW/Firmware
- Active Management Technology supported on selected SKUs:
  - i5-4300U and i7-4600U processors
  - LAN1 only: Intel I218 GbE “Clarkville” PHY + PCH integrated MAC
  - BIOS support (provided by default)
  - PCs with vPRO technology
- AMT communication does not depend on OS state or presence
- Remote out-of-band system monitor, maintain, update and repair

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Intense PC2 – Intel Virtualization Technology (VT)

- Makes a single system appear as multiple independent systems to software
- Allows multiple, independent operating systems to run simultaneously on a single system

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Intense PC2 – Industrial Functionality

- Auto On
- PXE Boot
- Watchdog
- Wake on LAN
- Wake on Timer
- Wake on USB
- Wake on PCI Express wake event

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Intense PC2 – Prices

Model	IPC2 Value	IPC2 i3	IPC2 i5	IPC2 i7
Barebone	$388	$552	$760	$902
Linux	N/A	N/A	N/A	$1008
Windows	N/A	N/A	N/A	$1175
SSD	N/A	N/A	N/A	$1052
Warranty	**5 years**	**5 years**	**5 years**	**5 years**

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FACE Modules

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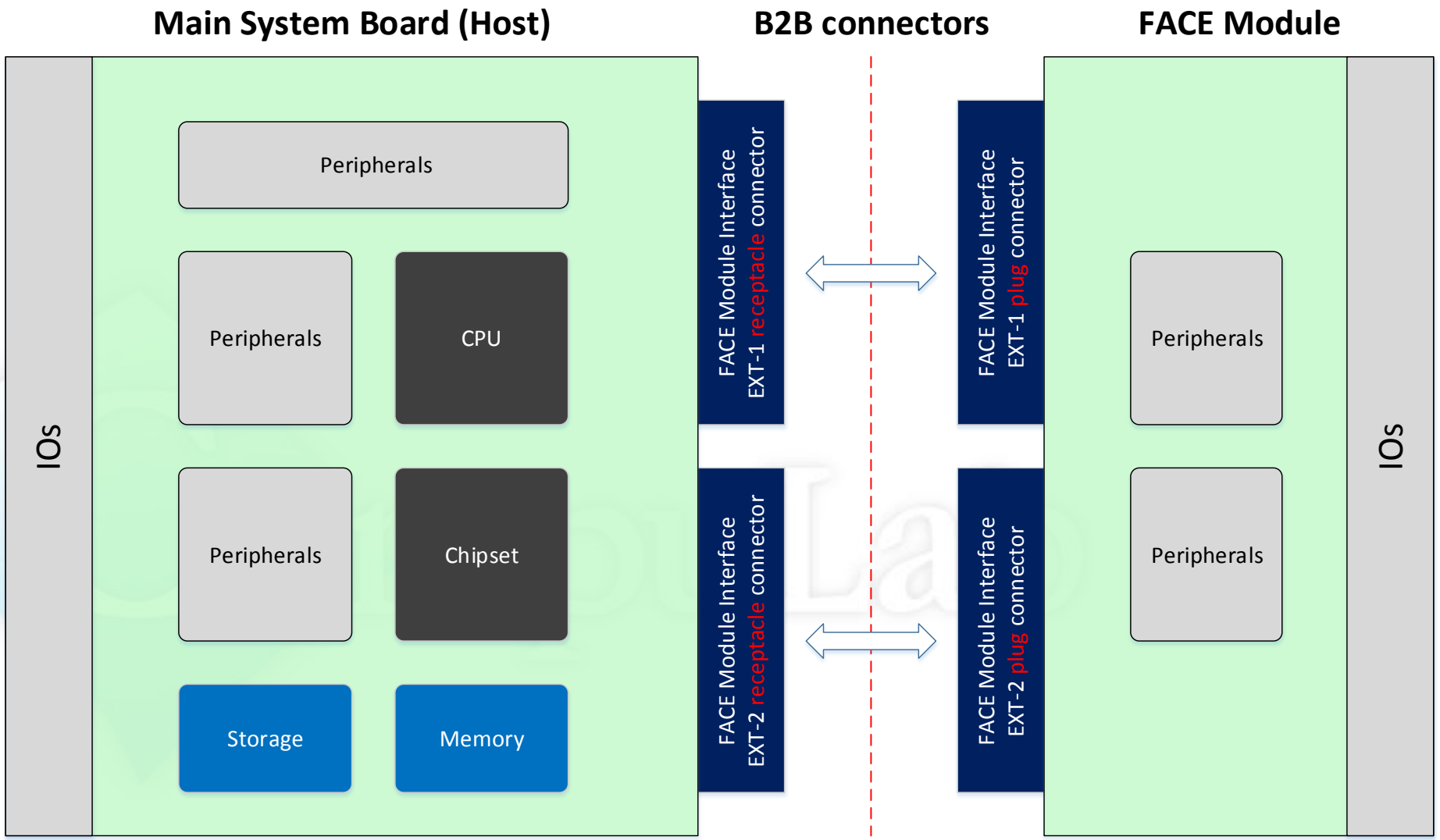
FACE Modules – Concept



FACE Modules – Highlights

- **F**unction **A**nd **C**onnectivity **E**xtension Module provides extended peripheral and I/O functionality
- Flexible Host interface design
- High speed connectivity offers PCI Express, SATA and USB Host interfaces
- Industry standard LPC Bus, RS232, SMBus/I2C and GPIOs
- Surveillance, CCTV and video capture solutions
- Off-the-shelf popular Networking solutions
- Application specific 3rd party design

FACE Modules - Portfolio Overview

FACE Module - HW Specs

FACE Modules featuring Intense PC2

IPC2 and FACE Modules compatibility

	FACE Modules							
Systems	**FM-4USB**	**FM-USB3**	**FM-SER**	**FM-1LAN**	**FM-4LAN**	**FM-2PCIE**	**FM-VC**	**FM-POE**
IPC2	✗	✓	✓	✓*	✓*	✓*	✓	✓

- FM-1LAN on IPC2 supports only two USB2.0 ports
- FM-4LAN on IPC2 supports only two USB2.0 ports
- FM-2PCIE on IPC2 supports only PCI Express interfaces on both mini PCIe slots. USB interface is not supported.

Reference Material

- For CompuLab website please visit:
  www.compulab.co.il

- For fit-PC product line website please visit:
  www.fit-pc.com

- FACE Modules compatibility matrix application note:
  http://fit-pc.com/download/face-modules/documents/app-note-products-fm-compatibility-matrix.pdf

Thank you